AN OVERVIEW THROUGH PORTUGUESE SEISMIC DESIGN REGULATION AND THE NEW EUROCODES

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ABSTRACT

The current Portuguese design codes for civil engineering structures date back from the 1980's. They will be replaced in a short term by the new Eurocodes which provide a common ground to the design of buildings and other civil engineering works and construction products. The Eurocodes introduce a series of changes when compared to the current Portuguese regulations that will influence the seismic design and behaviour of new structures, in particular reinforced concrete buildings. Historical research conducted focused on the structural safety regulations to trace a perspective in the earthquake-resistant design.

Keywords: Regulations, Seismic design, Seismic vulnerability.

INTRODUCTION

Currently, civil engineering structures are designed so as to be able to survive the most adverse actions expected to occur during their lifetime. As such, they should be designed and analyzed in order to be endowed with the capacity to withstand the demands being placed upon it. For the current regulatory picture, Portugal will watch closely the entry of the new Eurocodes, for what will surely be an appropriate time to look back and review what was done in the past. The new rules for design of structures are the result of an effort to harmonize within the European regulations and standards in each country. There is no doubt that this is an issue of utmost importance to better understand the behavior and performance of old structures if it is intended to undertake strengthening and rehabilitation actions for old buildings.

NATIONAL REGULATIONS FOR SAFETY AND DESIGN OF CIVIL ENGINEERING STRUCTURES

There are several sources that report the existence of regulations created shortly after the 1755 Lisbon earthquake to provide new capacity building resistant to earthquakes. Apparently it seems that Portugal was the first country to have a regulation devoted to protect buildings against earthquakes. The first regulations in the area of concrete emerged in Germany in 1904, in France in 1906 and in Britain in 1907. Portugal was no exception having had their first regulation in the area of concrete dated from 1918 and approved by Dec-Lei n.º4036. Prior to this date had already been reported in Portugal in the late nineteenth century, two other regulations in the construction area, the first dated 1897 and oriented to metal construction (Regulamento para projetos, provas e vigilância das pontes metálicas) and the second dated from 1903 and oriented to current urban buildings (Regulamento de Salubridade das Edificações Urbanas).
MAIN PROVISIONS RELATING TO THE SEISMIC ACTION

The recognition of the importance of action in seismic behavior of buildings and the need for its consideration in structural design is presented for the first time in Regulamento Geral das Edificações Urbanas. The first regulation to address the seismic action was the Regulamento de Segurança das Construções Contra os Sismos (RSCCS, 1958), being succeeded by Regulamento de Solicitações em Edifícios e Pontes (RSEP, 1961). Despite having been partially repealed by regulations that succeeded it, the RSCCS, complementing the general statement in RGEU, is still in force today some articles applicable to small masonry structures. Later, during the 1980’s, was published the regulation currently in force, Regulamento de Segurança e Acções para Estruturas de Edifícios e Pontes (RSA, 1983). It is also expected, in a short space of time, the publication of the Eurocode 8 (EN1998-1, 2004).

FINAL REMARKS

The deleterious effects associated with seismic actions express growing concern about the correct definition of this action during the design of structures. Increasingly, it becomes essential to ensure the integrity of structures and safety of its users. In this sense, have been created provisions intended to protect human lives, as well as the functionality of the important structures to the operation of civil protection and damage limitation, avoiding reinforcement costs disproportionately high compared to the cost structure. It is currently being studied the application of European regulations for the design of structures, which is meant to find more precise information than exists today. The definition of seismic action according to EC8 has important differences, as i) a more selective zoning; ii) distinct for each scenario seismic action and iii) consideration of five types of foundation soil. The EU regulation also aims to ensure that regulations where Portuguese law is silent, in particular, differentiating the seismic action by the materials that make up the framework presenting specific chapters to concrete buildings, steel buildings, buildings of mixed steel-concrete, wooden buildings and masonry buildings, as well as by, for example, specific provisions for structural elements such as beams, columns, beam-pillar and walls. It is in this context that this document will be aware of the differences between the requirements related to new regulations and those prescribed by national legislation and regulations repealed earlier or still ruling.

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